STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

October 3, 2006

MEMO TO: Don Lee, Berry Jenkins, Michael Taylor, Jay Bennett, Shannon Sweitzer, Judith Corley-Lay, Stuart Bourne, Jonathan Bivens, Jennifer Brandenburg, Brian Webb, Dave Rankin and Daniel Lieberman

FROM: Victor Barbour, PE
State Project Services Engineer

SUBJECT: AGC/Roadway Subcommittee Meeting Minutes
August 16, 2006

The subject committee met on August 16, 2006 at 10:00 a.m. in the Riverwood Conference Room at the Century Center with the following in attendance:

Jonathan Bivens	Dennis Jernigan	Ted Sherrod
Randy Garris	Daniel Lieberman	Shannon Sweitzer
Clyde Hopkins	Don Lee	Norma Smith
Scott Hidden	Meredith McDiarmid	Michael Taylor
Joseph Ishak	Ellis Powell	Brian Webb
Berry Jenkins	David Rankin	

The following items were discussed:

1. FUEL PRICE ADJUSTMENT-OPT OUT

The Department passed out a copy of a proposed special provision, adding an option of opting out of receiving price adjustments on fuel for specific items listed in the contract. It would be effective for both escalating and declining fuel prices. There was also a handout indicating how the Bid Express, Expedite file, Misc tab would look with the Opt-Out Option available. The Contractor will be asked to indicate their choice when placing their electronic bid. The special provision will be effective with the November 2006 Letting. (Handout No. 1)

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT SERVICES UNIT
1591 MAIL SERVICE CENTER
RALEIGH NC 27699-1591

TELEPHONE: 919-250-4128
FAX: 919-250-4119

WEBSITE: WWW.NCDOT.ORG

LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC

2. DEWATERING BORROW PITS

The Department stated that this proposed special provision is a result of negotiations between the Department and the Division of Water Quality to develop a procedure for monitoring borrow pit discharge. There were questions regarding when the background assessment is to be established, contractor monitoring and record keeping, Department QC and QA, and concerns about equality of DOT inspections. There were suggestions for adding language for staining, clarifying rare and unique resources, requests for a form for monitoring and a list of testing facilities for developing CEC values. This special provision will be revised and reviewed again at the October meeting. (Handout No. 2)

3. CONSTRUCTION AND MAINTENANCE OF SILT DETENTION DEVICES

The Department explained that this proposed special provision was developed to clarify how the Department pays for backfilling silt detention devices. There were questions concerning payment for material leftover after backfilling a silt detention device. This special provision and standard drawing will be revised and reviewed again at the October meeting. (Handout No. 3)

4. TEMPORARY SHORING

Scott Hidden of the Geotechnical Unit made a Power Point presentation of the proposed temporary shoring special provision. Berry mentioned that the AGC Structures Subcommittee had seen the presentation at their last meeting and made positive comments. It was requested that any comments be sent to Scott and Victor by September 1. This special provision and drawings will be revised and reviewed again at the October meeting. (Handout No. 4)

5. ELECTRONIC FILE UPDATE

Shannon Sweitzer updated the committee on the Department's efforts to provide the contracting industry with electronic files during the bidding process. Contractors will request the electronic files when available through the Project Letting web page. Upon request, the Department will FTS the file to the requesting party. In addition, Shannon informed the group that electronic files will be available for several projects in the near future. Those projects and their tentative lettings are R-2245 (December Let), U-4026 (December Let) and R-609/R-2206 (February Let).

6. Meeting Dates Update for 2006

The forthcoming meetings for the remainder of 2006 will be at 10:00 a.m. on the following dates in the Riverwood Conference Room (formerly called Project Services Large Conference Room). If you have any agenda items for the October meeting, please contact Berry Jenkins or myself.

October 18
December 20

You may want to reserve all day for the meeting in case it runs long, or there is a need to make a field trip in the afternoon.

cc: Art McMillan, P.E.
Steve DeWitt, P.E
Ellis Powell, P.E.
Ted Sherrod, P.E.
Randy Garris, P.E.
Scott Hidden, P.E.
Dennis Jernigan, P.E.
Meredith McDiarmid, P.E.
Clyde Hopkins
Joseph Ishak, P.E.
Norma Smith

FUEL PRICE ADJUSTMENT:
(11-15-05) (Rev 9-20-06) SP1 G43

Revise the *2006 Standard Specifications* as follows:

Page 1-93, Article 109-8 Fuel Price Adjustment is amended to add the following as the first paragraph:

Bidders will have the option to *opt-out* of receiving a fuel price adjustment on this contract. Bidders shall designate in their bid submission in the Miscellaneous Data Folder of Transport Expedite whether or not they wish to participate or opt out of receiving a fuel price adjustment on items designated in the contract. If no designation is shown in the bid, the bidder will be subject to the fuel price adjustment. Once the bidder has submitted the bid, the bidder will not be allowed to change the designation. If the bidder indicates that they want to participate in the fuel price adjustment, it shall be paid as follows:

Page 1-93 Subarticle 109-8, add the following:

The base index price for DIESEL #2 FUEL is $ per gallon.

Where any of the following are included in the contract, they will be eligible for fuel price adjustment.

The item(s) of work and the fuel factor used in calculating adjustments to be made are as follows:

Description	Units	Fuel Usage Factor Diesel
Unclassified Excavation	Gal/CY	0.29
Borrow Excavation	Gal/CY	0.29
Aggregate Base Course	Gal/Ton	0.55
Asphalt Concrete Base Course, Type ___	Gal/Ton	2.90
Asphalt Concrete Intermediate Course, Type ___	Gal/Ton	2.90
Asphalt Concrete Surface Course, Type ___	Gal/Ton	2.90
Open-Graded Asphalt Friction Course	Gal/Ton	2.90
Sand Asphalt Surface Course, Type ___	Gal/Ton	2.90
Aggregate for Cement Treated Base Course	Gal/Ton	0.55
Portland Cement for Cement Treated Base Course	Gal/Ton	0.55
___ In. Portland Cement Concrete Pavement	Gal/SY	0.245
Concrete Shoulders Adjacent to ___ In. Pavement	Gal/SY	0.245

Proposed Language for Transport Expedite Misc Folder:

(Add at the bottom of Misc file)

Fuel Price Adjustment Opt-Out Clause

Bidders have the option to accept or reject Fuel Price Adjustments in accordance with the requirements of Article 109-8 Fuel Price Adjustments and the provisions in the contract. To indicate the choice, the bidder shall enter an X in one of the blocks below.

The bidder will not be permitted to change the option after the bid is accepted.

Enter X in one box only:

- ☐ Yes, the bidder accepts fuel price adjustments for this project in accordance with Article 109-8.

- ☐ No, the bidder declines fuel price adjustments for this project.

In the event the bidder does not enter an X in either box, the bidder will receive fuel adjustments for the items shown in the contract.

CONSTRUCTION AND MAINTENANCE OF SILT DETENTION DEVICES:

10-17-06 SP16 R 02

Revise the *2006 Standard Specifications* as follows:

Pages 16-9 and 16-10, delete Article 1630 in its entirety and replace with the following:

1630-1 DESCRIPTION

Work includes but is not limited to excavating and shaping of the basins, ditches, and other silt detention devices, shaping berms, cleaning and maintaining the detention devices and removing or backfilling detention devices at end of project or as directed.

1630-2 CONSTRUCTION METHODS

Install silt detention devices to the dimensions and at the locations shown on the plans or as directed for the purpose of sedimentation control. Use any excavated material in constructing the silt detention devices; otherwise, utilize in roadway embankments or dispose of in accordance with Section 802. Clean silt detention devices when directed, in order to maintain their effectiveness. Backfill, shape, seed and mulch silt detention devices prior to completion of the project unless otherwise directed.

1630-3 MEASUREMENT AND PAYMENT

Silt Excavation will be measured and paid for in cubic yards measured in the original position, of all materials excavated within the limits established by the plans or as directed. If in the opinion of the Engineer it is not feasible to measure the excavated material in its original position, the volume will be determined by truck measurement in accordance with Subarticle 230-5(C), except that no deduction for shrinkage will be made.

No additional payment will be made for backfill material that was originally excavated from the detention devices and paid for as Silt Excavation. Additional material needed to backfill silt detention devices will be paid for as provided in Section 225 for Unclassified Excavation or in Section 230 for Borrow Excavation, depending on the source of the material used to fill the silt detention devices.

Seeding and Mulching will be measured and paid in accordance with Article 1660-8.

Payment will be made under:

Pay Item	**Pay Unit**
Silt Excavation	Cubic Yard

PROCEDURE FOR MONITORING BORROW PIT DISCHARGE:

DRAFT 8-16-06 Ted's version SP 1G TBA

Water discharge from borrow pit sites shall not cause surface waters to exceed 50 NTUs (nephelometric turbidity unit) in streams not designated as trout waters and 10 NTUs in streams, lakes or reservoirs designated as trout waters. For lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTUs. If the turbidity exceeds these levels due to natural background conditions, the existing turbidity level shall not be increased.

If during any operating day, the downstream water quality exceeds the standard, the Contractor shall do all of the following:

(A) Either cease discharge or modify the discharge volume or turbidity levels to bring the downstream turbidity levels into compliance, or

(B) Evaluate the upstream conditions to determine if the exceedance of the standard is due to natural background conditions. If the background turbidity measurements exceed the standard, operation of the pit and discharge can continue as long as the stream turbidity levels are not increased due to the discharge.

(C) Measure and record the turbidity test results (time, date and sampler) at all defined sampling locations 30 minutes after startup and at a minimum, one additional sampling of all sampling locations during that 24-hour period in which the borrow pit is discharging.

(D) Notify DWQ within 24 hours of any stream turbidity standard exceedances that are not brought into compliance.

During the Environmental Assessment required by Article 230-4 of the *Standard Specifications*, the Contractor shall define the point at which the discharge enters into the State's surface waters and the appropriate sampling locations. Sampling locations shall include points upstream and downstream from the point at which the discharge enters these waters. Upstream sampling location shall be located so that it is not influenced by backwater conditions and represents natural background conditions. Downstream sampling location shall be located at point where complete mixing of the discharge and receiving water has occurred.

The discharge shall be closely monitored when water from the dewatering activities is introduced into jurisdictional wetlands. Any time visible sedimentation on the wetland surface is observed, the dewatering activity will be suspended until turbidity levels in the stilling basin can be reduced to a level where sediment deposition does not occur. No activities shall occur in wetlands that adversely affect the functioning of a wetland. Visible sedimentation will be considered an indication of possible adverse impacts on wetland use.

The Engineer will perform independent turbidity tests on a random basis. These results will be maintained in a log within the project records. Records will include, at a minimum, turbidity test results, time, date and name of sampler. Should the Department's test results exceed those of the

Contractor's test results, an immediate test shall be performed jointly with the results superceding the previous test results of both the Department and the Contractor.

The Contractor shall use the *NCDOT Turbidity Reduction Options for Borrow Pits Matrix,* available at *www.http: ncdot---* to plan, design, construct, and maintain BMPs to address water quality standards. Tier I Methods include stilling basins which are standard compensatory BMPs. Other Tier I methods are noncompensatory and shall be used when needed to meet the stream turbidity standards. Tier II Methods are also noncompensatory and are options that may be needed for protection of rare or unique resources or where special environmental conditions exist at the site which have let to additional requirements being placed in the DWQ's 401 Certifications and approval letters, Isolated Wetland Permits, Riparian Buffer Authorization or a DOT Reclamation Plan's Environmental Assessment for the specific site.

The Contractor may use cation exchange capacity (CEC) values from proposed site borings to plan and develop the bid for the project. CEC values exceeding 15 milliequivalents per 100 grams of soil may indicate a high potential for turbidity and should be avoided when dewatering into surface water is proposed.

No additional compensation for monitoring borrow pit discharge will be paid

TEMPORARY SHORING **TBD-06**

DESCRIPTION

This special provision governs the design and construction of temporary shoring in accordance with the plans and Standard Shoring Details as directed by the Engineer. The Standard Shoring Details include the *Standard Temporary Shoring Detail* and the *Standard Temporary Mechanically Stabilized Earth (MSE) Wall Details*.

Furnish, install and remove piling, shoring and bracing at locations shown on the plans and other locations as directed by the Engineer. Temporary shoring may be required to maintain traffic and for other reasons as shown on the plans or as determined by the Engineer. Unless noted otherwise on the plans, shoring required to maintain traffic is defined as shoring necessary to provide lateral support to the side of an excavation or embankment parallel to an open travelway when a theoretical 2:1 (H:V) slope from the bottom of the excavation or embankment intersects the existing ground line closer than 5 ft (1.5 m) from the edge of pavement of the open travelway. No value engineering proposals will be accepted based solely on revising or eliminating the shoring locations shown on the plans or the estimated quantities shown in the bid item sheets as a result of actual field measurements or site conditions. The Engineer will determine whether value engineering proposals involving temporary shoring are acceptable.

For the purposes of this provision, "standard shoring" refers to both the *standard temporary shoring* and the *standard temporary MSE walls*. Unless noted otherwise on the plans or as directed by the Engineer, use the standard shoring or design a temporary shoring system in accordance with the "Contractor Designed Shoring" section of this provision. When the plans or the Engineer prohibit one or both types of standard shoring, Contractor designed shoring may be required. When the plans require a temporary MSE wall, use one of the standard temporary MSE wall options or submit an alternative temporary MSE wall design. Provide all shoring submittals in accordance with this provision before beginning work.

This provision applies to non-anchored temporary shoring systems and the standard shoring. If the Contractor chooses to provide an anchored temporary shoring system or any other shoring system for which this provision does not apply, the Engineer will provide an applicable special provision. Trench boxes are not considered temporary shoring and this provision is not applicable to trench boxes. This provision is also not applicable to the installation of pipes, drop inlets and utilities unless noted otherwise on the plans.

MATERIALS

(A) Certifications, Storage and Handling

Provide Type 7 Contractor's Certifications for all shoring materials used with the exception of reinforcing fabrics and geogrids. Furnish Type 5 Certified Test Reports for all seam strengths and reinforcing fabric and geogrid properties.

Load, transport, unload and store shoring materials such that they are kept clean and free of damage. Identification, storage and handling of all geogrids and geotextile fabrics shall meet the requirements of ASTM D4873 and as directed by the Engineer. Geogrids and fabrics with defects, flaws, deterioration or damage will be rejected. Do not leave fabric or geogrid uncovered for more than seven (7) days.

(B) Shoring Backfill

Use shoring backfill for the construction of all temporary shoring systems including filling behind cantilever shoring and in the reinforced zone for temporary MSE walls. Shoring backfill around culverts shall meet the requirements of Class II Type I through Class VI in accordance with the Standard Specifications. Shoring backfill for all other applications shall meet the requirements for around culverts or AASHTO M145 for soil classification A-2-4 with a maximum plasticity index (PI) of 6.

(C) Non-anchored Temporary Shoring

All steel shapes, plates and piles shall meet the requirements of ASTM A36. All sheet piling shall be hot rolled and meet the requirements of ASTM A328. All timber lagging shall have a minimum allowable bending stress of 1000 psi (6.9 MPa) and meet the requirements of Article 1082-1 of the Standard Specifications. For standard temporary shoring, use pile sections and lengths and lagging sizes as shown on Standard Temporary Shoring Detail.

(D) Temporary MSE Walls

All welded wire reinforcement forms, facings, mesh and mats shall meet the requirements of AASHTO M55 or M221. All wire for welded wire wall components and support struts shall meet the requirements of AASHTO M32. For standard temporary MSE walls, use wire gauges, strut sizes and welded wire components as shown on the Standard Temporary MSE Wall Details.

For Foster Temporary Walls, use 0.505" (13 mm) diameter connector bars that meet the requirements of AASHTO M32.

(1) Geotextile Fabrics

Geotextile fabrics shall consist of strong rot-proof synthetic fibers and be free of any treatment or coating that might significantly alter the physical properties before or after installation. Fabric fibers shall contain stabilizers and/or inhibitors to make the filaments resistant to deterioration resulting from ultraviolet or heat exposure. The fabric shall be a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative position with respect to each other. Finish the edges of the fabrics to prevent the outer fibers from pulling away from the fabric. Bond or sew seams together with a fungus resistant material and do not use nylon thread.

(a) Reinforcing Fabric

Use woven polyester, polyethylene or polypropylene fabric that meets the following properties:

Property	Test Method	Requirement
Tensile Strength @ 5% Strain	ASTM D4595	Varies* (100 lb/in or 18 kN/m min)
Tensile Strength @ Ultimate	ASTM D4595	Varies*
Puncture Strength	ASTM D4833	130 lb (0.578 kN) min
Trapezoid Tear	ASTM D4533	100 lb (0.444 kN) min (warp and fill direction)
UV Resistance after 500 hrs	ASTM D4355	70 %
Apparent Opening Size (AOS), US Sieve	ASTM D4751	20 min – 70 max (0.212 mm min – 0.850 mm max)
Permittivity	ASTM D4491	0.20 sec^{-1}

ALL VALUES ABOVE REPRESENT MINIMUM AVERAGE ROLL VALUES (ANY ROLL IN A LOT SHOULD MEET OR EXCEED THE MINIMUM VALUES SHOWN IN THIS TABLE).

*** TENSILE STRENGTHS APPLY TO BOTH THE MACHINE AND CROSS-MACHINE DIRECTIONS.**

For standard temporary MSE walls (temporary fabric wall option), use reinforcing fabric tensile strengths and lengths as shown on the Standard Temporary MSE Wall Details.

(b) Retention Fabric

RETAIN SHORING BACKFILL AT THE FACE OF TEMPORARY MSE WALLS WITH RETENTION FABRIC. FABRIC SHALL MEET THE REQUIREMENTS OF AASHTO M288, CLASS 2 AND THE UV RESISTANCE, AOS AND PERMITTIVITY SHOWN ABOVE FOR REINFORCING FABRIC.

(2) SierraScape Temporary Wall

Geogrids shall be uniaxial (UX) geogrids composed of high-density polyethylene (HDPE) manufactured by Tensar Earth Technologies. Test geogrid properties with the following methods:

Property	Test Method
Tensile Strength	ASTM D6637
Junction Strength	GRI-GG2*
Flexural Rigidity	ASTM D1388
Deterioration	ASTM D4355

*As modified by AASHTO Standard Specifications for Highway Bridges, 2002 Interim, using a single rib having the greater of 3 junctions or 8 in (200 mm) and tested at a strain rate of 10% per minute based on this gauge length.

Connection rods are required to transfer the load between the facings and geogrids. Use rods manufactured by Tensar Earth Technologies composed of HDPE with fiberglass inclusions or oriented polypropylene.

For standard temporary MSE walls (SierraScape temporary wall option), use geogrid types and lengths and a connection rod size as shown on the Standard Temporary MSE Wall Details.

(3) TerraTrel Temporary Wall

Reinforcing strips shall be ribbed steel strips manufactured by The Reinforced Earth Company meeting the requirements of ASTM A572, grade 65 ksi (450 MPa) steel. Connector rods shall meet the requirements of AASHTO M31, grade 60 ksi (410 MPa) steel and hair pin connectors shall meet the requirements of ASTM A1011, grade 50 ksi (345 MPa) steel. Bolts, nuts and washers shall meet the requirements of AASHTO M164.

For standard temporary MSE walls (TerraTrel temporary wall option), use ribbed steel strip size and lengths, rod lengths and diameters, hairpin connectors, bolts, nuts and washers as shown on the Standard Temporary MSE Wall Details.

EMBEDMENT

For the purposes of this provision, "embedment" is defined as the depth of the shoring below the bottom of the excavation or finished or existing grade in front of the shoring. For cantilever shoring, embedment is the depth of the piling below the grade in front of the shoring. For a temporary MSE wall, embedment is the difference between the grade in front of the wall and the bottom of the reinforced zone.

CONCRETE BARRIER AND CLEAR DISTANCE

Provide portable concrete barriers to protect temporary shoring if shoring is located within the clear zone as defined in the latest edition of AASHTO Roadside Design Guide. Use NCDOT portable concrete barriers (PCBs) in accordance with Roadway Standard Drawing No. 1170.01 and Section 1170 of the Standard Specifications. Use Oregon type F barriers in accordance with the detail and provision located on the web at:

Insert Website

Unless noted otherwise on the plans, set portable concrete barriers with a minimum of 2 ft (0.6 m) between the front face of the barrier and the edge of the nearest traffic lane. For portable concrete barriers above and behind temporary MSE walls, provide a minimum of 3 ft (1 m) between the edge of pavement and the wall face. These distances are illustrated in the figures below. If these minimum required distances are not available, contact the Engineer.

For traffic lanes and portable concrete barriers located above and behind temporary shoring, the following are defined as:
Clear Distance – Horizontal distance from the back face of the barrier to the edge of pavement as shown below for temporary MSE wall and non-anchored temporary shoring

NOTE: DRAWING NOT INCLUDED HERE

Offset – Horizontal distance from the front face of the barrier to centerline of the furthest traffic lane as shown below for 3 traffic lanes

Based on the clear distance, offset, design speed and pavement type, choose an unanchored PCB, anchored PCB or an Oregon barrier from the table below:

MINIMUM REQUIRED CLEAR DISTANCE, in (mm)
TABLE NOT INCLUDED HERE

Note: Table above is based on NCDOT Research Project No. 2005-010 with vehicle type used for NCHRP 350 crash tests. Barrier deflections and resulting minimum required clear distances might vary significantly for larger heavier vehicles and wet or dry pavement.

At the Contractor's option or if the minimum required clear distance is not available, use an unanchored PCB and design temporary shoring for traffic impact in accordance with "Contractor Designed Shoring" section below or use the "surcharge case with traffic impact" for the standard temporary shoring. A portable concrete barrier option from the table above is required for barriers above and behind temporary MSE walls.

CONTRACTOR DESIGNED SHORING

Contractor designed shoring does not apply to temporary MSE walls designed by the Contractor. See "Standard Temporary MSE Walls" section of this provision for alternate temporary MSE walls in lieu of the standard temporary MSE wall options.

Before beginning design, survey the shoring location to determine existing elevations and actual design heights. Submit two (2) sets of design calculations and seven (7) copies of drawings for review and acceptance showing details of the proposed shoring design and construction sequence in accordance with Article 105-2 of the Standard Specifications. Have shoring designed, detailed and sealed by a Professional Engineer registered in the State of North Carolina.

Design temporary shoring for a 3-year design service life and in accordance with the latest edition of AASHTO Guide Design Specifications for Bridge Temporary Works. Design cantilevered shoring in accordance with the latest edition of AASHTO Allowable Stress Design Standard Specifications for Highway Bridges.

For the purposes of this provision, the following are defined as:
Top of Shoring – Point at which the grade intersects the back face of the shoring
*Bottom of Shorin*g – Point at which the grade intersects the front face of the shoring
Shoring Height (h) – Difference between the top and bottom of shoring

Design temporary shoring for a traffic surcharge equal to 240 psf (11.5 kPa). This surcharge is not applicable for construction traffic. If a construction surcharge will be present within a horizontal distance of the shoring equal to "h", design the shoring for the required construction surcharge. If the edge of pavement or a structure to be protected is within a horizontal distance of the shoring equal to "h", design shoring for a maximum of 3 in (75 mm) of deflection. Otherwise, design shoring for a maximum of 6 in (150 mm) of deflection.

Use 2 kips/ft (29.2 kN/m) applied at 1.5 ft (450 mm) above the ground line behind the shoring for traffic impact. When designing for traffic impact, extend the shoring at least 32 in (800 mm) above the top of shoring elevation. Otherwise, extend shoring at least 6 in (150 mm) above the top of shoring elevation.

STANDARD SHORING

The standard shoring is based on the following in-situ assumed soil parameters:

- Total Unit Weight = 120 pcf (18.8 kN/m^3)
- Friction Angle = 30 degrees
- Cohesion = 0 psf (0 kPa)

Groundwater is assumed to be below bottom of shoring or wall. If the assumed soil parameters are not applicable, Contractor designed shoring is required.

Do not use the standard temporary shoring when the groundwater is above the bottom of shoring. Also, do not use the standard shoring when very loose or soft soil or muck is present within the embedment depth for the standard temporary shoring or below the standard temporary MSE wall.

When the alignment of a standard temporary MSE wall results in an interior angle less than 90 degrees such that the reinforcement overlaps, submit an acute corner detail for the specific situation in accordance with the wall vendor recommendations. Also, submit a "Standard Temporary MSE Wall Selection Form" for each standard temporary MSE wall location and a "Standard Temporary Shoring Selection Form" for up to three standard temporary shoring locations. Submit all these items at least fourteen (14) days before beginning the associated construction.

The standard shoring selection forms are located on the web at:
http://www.doh.dot.state.nc.us/preconstruct/highway/geotech/formprovdet/

(A) Standard Temporary Shoring

The standard temporary shoring is based upon the following conditions:

- Maximum shoring height is 12 ft (3.7 m).
- Traffic surcharge is 240 psf (11.5 kPa) maximum or backslope is 2:1 (H:V) or flatter.
- Bottom of excavation or existing grade in front of shoring is 6:1 (H:V) slope or flatter.
- H pile spacing is 6 ft (1.8 m).
- H pile embedment depths are for driven piles. H pile embedment depths for piles placed in drilled holes are 75% of the embedment depths shown for driven piles.
- Timber lagging is a minimum of 3 in (75 mm) thick.

If these conditions are not met, a Contractor designed shoring may be required.

Determine the shoring height, traffic impact, groundwater condition and slope or surcharge case for each standard temporary shoring location. Determine the minimum required extension, embedment and sheet pile section modulus or H pile section from the Standard Temporary Shoring Detail for each location. Provide sheet piling or H piles and timber lagging that meets the minimum requirements.

(B) Standard Temporary MSE Walls

The standard temporary MSE walls are based upon the following conditions:

- Maximum wall height is 28 ft (8.5 m).
- Traffic surcharge is 240 psf (11.5 kPa) maximum or backslope is 2:1 (H:V) or flatter.
- Existing or finished grade in front of wall is 6:1 (H:V) slope or flatter.
- The grade of the top of wall is less than 4% for the TerraTrel Temporary Wall and the Foster Temporary Wall.
- Design service life is 3 years.
- Material in reinforced zone is shoring backfill.
- Maximum applied bearing pressure is 1 tsf (100 kPa) for wall heights up to 8 ft (2.4 m), 2 tsf (195 kPa) for wall heights between 8 and 18 ft (2.4 and 5.5 m) and 3 tsf (290 kPa) for wall heights over 18 ft (5.5 m).

If these conditions are not met, a Contractor designed shoring may be required.

Five options are provided in the Standard Temporary MSE Wall Details. Each option with the reinforcement type, vendor and contact information are listed below:

Standard Temporary MSE Wall Option	Reinforcement Type	Vendor and Contact Information
Temporary Fabric Wall	Polyester, Polyethylene or Polypropylene Fabric	N/A
Hilfiker Temporary Wall	Welded Wire Mat	Hilfiker Retaining Walls 1902 Hilfiker Lane Eureka, CA 95503-5711 (707) 443-5093 www.hilfiker.com
SierraScape Temporary Wall	Geogrid	Tensar Earth Technologies, Inc. 5883 Glenridge Drive, Suite 200 Atlanta, GA 30328-5363 (404) 250-1290 www.tensarcorp.com
Foster Temporary Wall	Welded Wire Mesh	Foster Geotechnical 1372 Old Bridge Road, Suite 101 Woodbridge, VA 22192-2708 (703) 499-9818 www.lbfoster.com/geotechnical
TerraTrel Temporary Wall	Ribbed Steel Strips	The Reinforced Earth Company 8614 Westwood Center Drive, Suite 1100 Vienna, VA 22182-2233 (703) 749-4325 www.reinforcedearth.com

Step bottom of reinforced zone in increments equal to vertical reinforcement spacing for the wall option chosen. Determine the wall height and slope or surcharge case for each

section of standard temporary MSE wall. With the exception of either the first or last section of wall, use horizontal section lengths in increments equal to the following for the wall option chosen.

Standard Temporary MSE Wall Option	Increment
Temporary Fabric Wall	9 ft (2.7 m)
Hilfiker Temporary Wall	10 ft (3.0 m)
SierraScape Temporary Wall	18 ft – 7 ¼ in (5.7 m)
Foster Temporary Wall	24 ft (7.3 m)
TerraTrel Temporary Wall	19 ft – 8 in (6.0 m)

Determine the appropriate facings and/or forms and reinforcement length, spacing, strength, type, density and/or size from the Standard Temporary MSE Walls Details for each wall section. Provide facings, forms and reinforcement that meet the minimum requirements.

Do not use more than one temporary MSE wall option or type per wall location. An alternate temporary MSE wall type may be submitted for review and acceptance in lieu of the standard temporary MSE wall options above. When this occurs, submit two (2) sets of design calculations and seven (7) copies of drawings for review and acceptance showing details of the proposed temporary MSE wall design and construction sequence in accordance with Article 105-2 of the Standard Specifications. Have the temporary MSE wall designed, detailed and sealed by a Professional Engineer registered in the State of North Carolina. Design the temporary MSE wall for a 3-year design service life in accordance with the latest edition of AASHTO Allowable Stress Design Standard Specifications for Highway Bridges. Use the in-situ assumed soil parameters from the "Standard Shoring" section of this provision for design.

CONSTRUCTION REQUIREMENTS

When using an anchored PCB, anchor the barrier in accordance with Roadway Standard Drawing 1170.01 and Section 1170 of the Standard Specifications. Control drainage during construction in the vicinity of temporary shoring. Collect and direct run off away from temporary MSE walls, shoring and shoring backfill.

(A) Non-anchored Temporary Shoring

Install and interlock sheet piling or install piles as shown on the approved plans or the Standard Temporary Shoring Detail with a tolerance of ½ inch per foot (42 mm per meter) from vertical. Contact the Engineer if the design embedment is not achieved. If piles are placed in drilled holes, perform pile excavation to the required elevations and backfill the excavations with concrete and lean sand grout.

Remove grout as necessary to install timber lagging. Install timber lagging with a minimum bearing distance of 3 in (75 mm) on each pile flange. Backfill voids behind lagging with shoring backfill.

Perform welding in accordance with the approved plans and Article 1072-20 of the Standard Specifications.

(1) Pile Excavation

Excavate a hole with a diameter that will result in at least 3 in (75 mm) of clearance around the entire pile. Use equipment of adequate capacity and capable of drilling through soil and non-soil including rock, boulders, debris, man-made objects and any other materials encountered. Blasting is not permitted to advance the excavation. Blasting for core removal is only permitted when approved by the Engineer. Dispose of drilling spoils in accordance with Section 802 of the Standard Specifications and as directed by the Engineer. Drilling spoils consist of all excavated material including water removed from the excavation either by pumping or drilling tools.

If unstable, caving or sloughing soils are encountered, stabilize the excavation with steel casing. Steel casing may be either the sectional type or one continuous corrugated or non-corrugated piece. Steel casings should consist of clean watertight steel of ample strength to withstand handling and driving stresses and the pressures imposed by concrete, earth or backfill. Use steel casings with an outside diameter equal to the hole size and a minimum wall thickness of ¼ in (6 mm).

Before placing concrete, check the water inflow rate in the excavation after any pumps have been removed. If the inflow rate is less than 6 in (150 mm) per half hour, remove any water and free fall the concrete into the excavation. Ensure that concrete flows completely around the pile. If the water inflow rate is greater than 6 in (150 mm) per half hour, propose a concrete placement procedure to the Engineer. The Engineer must approve the concrete placement procedure before placing concrete.

Center the pile in the excavation and fill the excavation with Class A concrete in accordance with Section 1000 of the Standard Specifications except as modified herein. Provide concrete with a slump of 6 to 8 in (150 to 200 mm). Use an approved high-range water reducer to achieve this slump. Place concrete in a continuous manner to the bottom of the excavation. Fill the remainder of the excavation with a lean sand grout to the ground surface and remove all casings.

(B) Temporary MSE Walls

The Engineer may require a wall preconstruction meeting to discuss the construction and inspection of the temporary MSE walls. If required, conduct the meeting with the Site Superintendent, the Resident or Bridge Maintenance Engineer and/or his or her representatives, the Bridge Construction Engineer and the Geotechnical Operations Engineer before beginning wall construction.

Perform all necessary clearing and grubbing in accordance with Section 200 of the Standard Specifications. Excavate as necessary for standard temporary MSE walls in accordance with the following for the wall option chosen:

- minimum embedment of 18 in (450 mm) unless wall bears on rock, concrete or pavement as determined by the Engineer
- vertical steps in increments equal to the vertical reinforcement spacing
- with the exception of either the first or last section of wall, horizontal section lengths in increments equal to those shown in the "Standard Shoring" section of the this provision

Notify the Engineer when foundation excavation is complete. Do not place shoring backfill or the first reinforcement layer until obtaining approval of the excavation depth and checking foundation material for in-situ assumed soil parameters.

If applicable, install foundations located within the reinforced zone before beginning wall construction unless directed otherwise by the Engineer.

For standard temporary MSE walls, erect and maintain facings and forms as shown on the Standard Temporary MSE Wall Details. Stagger vertical joints of facings and forms when possible unless shown otherwise on the details.

Place facings and forms as near to vertical as possible. Construct temporary MSE walls with a vertical and horizontal tolerance of 3 in (75 mm) when measured with a 10 ft (3 m) straight edge and an overall vertical plumbness (batter) and horizontal alignment of less than 6 in (150 mm).

For standard temporary MSE walls, place reinforcement at the locations and elevations shown on the Standard Temporary MSE Wall Details. Repair or replace any damaged reinforcement to the satisfaction of the Engineer. Contact the Engineer when existing or future structures such as pavements, pipes, inlets or utilities will interfere with the reinforcement. To avoid structures, deflect, skew and cut reinforcement as directed by the Engineer.

Do not splice reinforcement parallel to the wall face. Place reinforcement smooth and free from tension, stress, folds, wrinkles or creases and perpendicular to the face of the wall.

Bond or sew adjacent reinforcing fabric together or overlap fabric a minimum of 18 in (450 mm) with seams orientated perpendicular to the wall face.

Place shoring backfill in the reinforced zone in 8 to 10 in (200 to 250 mm) thick lifts and compact in accordance with Subarticle 235-4(C) of the Standard Specifications. Use only hand operated compaction equipment within 3 ft (1 m) of the wall face. Do not damage reinforcement when placing and compacting shoring backfill. End dumping directly on the reinforcement is not permitted. Do not operate heavy equipment on the reinforcement until it is covered with at least 10 in (250 mm) of shoring backfill. Do not use sheepfoot, grid rollers or other types of equipment with feet.

For standard temporary MSE walls, place top reinforcement layer between 4 and 24 in (100 and 600 mm) below top of wall depending on wall option as shown on the Standard Temporary MSE Wall Details. Fold over top layer of reinforcing or retention fabric and anchor with a minimum of 3 in (75 mm) of backfill cover.

Bench temporary MSE walls into the sides of excavations where applicable and as directed by the Engineer. If the top of wall is within 5 ft (1.5 m) of finished grade, remove top form or facing and incorporate the top reinforcement layer into the fill when placing fill in front of the wall. Temporary MSE walls remain in place permanently unless directed otherwise by the Engineer.

MEASUREMENT AND PAYMENT

Temporary Shoring will be measured and paid for as the number of square feet (square meters) of exposed face area at locations shown on the plans or required by the Engineer. For temporary MSE walls, the wall height will be measured as the difference between the top and bottom of wall and does not include the embedded portions of the wall or any pavement thickness above the wall. For all other temporary shoring systems, the shoring height will be measured as the difference between the top and bottom of shoring as defined in "Contractor Designed Shoring" section of this provision. No payment will be made for any extension of shoring above the top of shoring or any embedment below the bottom of shoring. No payment will be made for temporary shoring not shown on the plans or required by the Engineer including shoring for OSHA reasons or the Contractor's convenience. Such price and payment will be full compensation for furnishing all labor, tools, equipment, materials and all incidentals necessary to design and install the temporary shoring and complete the work as described in this provision.

Measurement and payment for portable concrete barriers will be in accordance with Section 1170 of the Standard Specifications with the following exception. No additional payment will be made for Oregon barriers or anchored PCBs above and behind temporary shoring. Additional costs for Oregon or anchored PCBs will be considered incidental to *temporary shoring*.

Payment will be made under:

Pay Item	**Pay Unit**
Temporary Shoring	Square Feet (Square Meters)